B. D. REESE.

DIRIGIBLE BALLOON.

APPLICATION FILED JUNE 8, 1909.

939,089.

Patented Nov. 2, 1909.

3 SHEETS—SHEET 1.

Fig. 1.

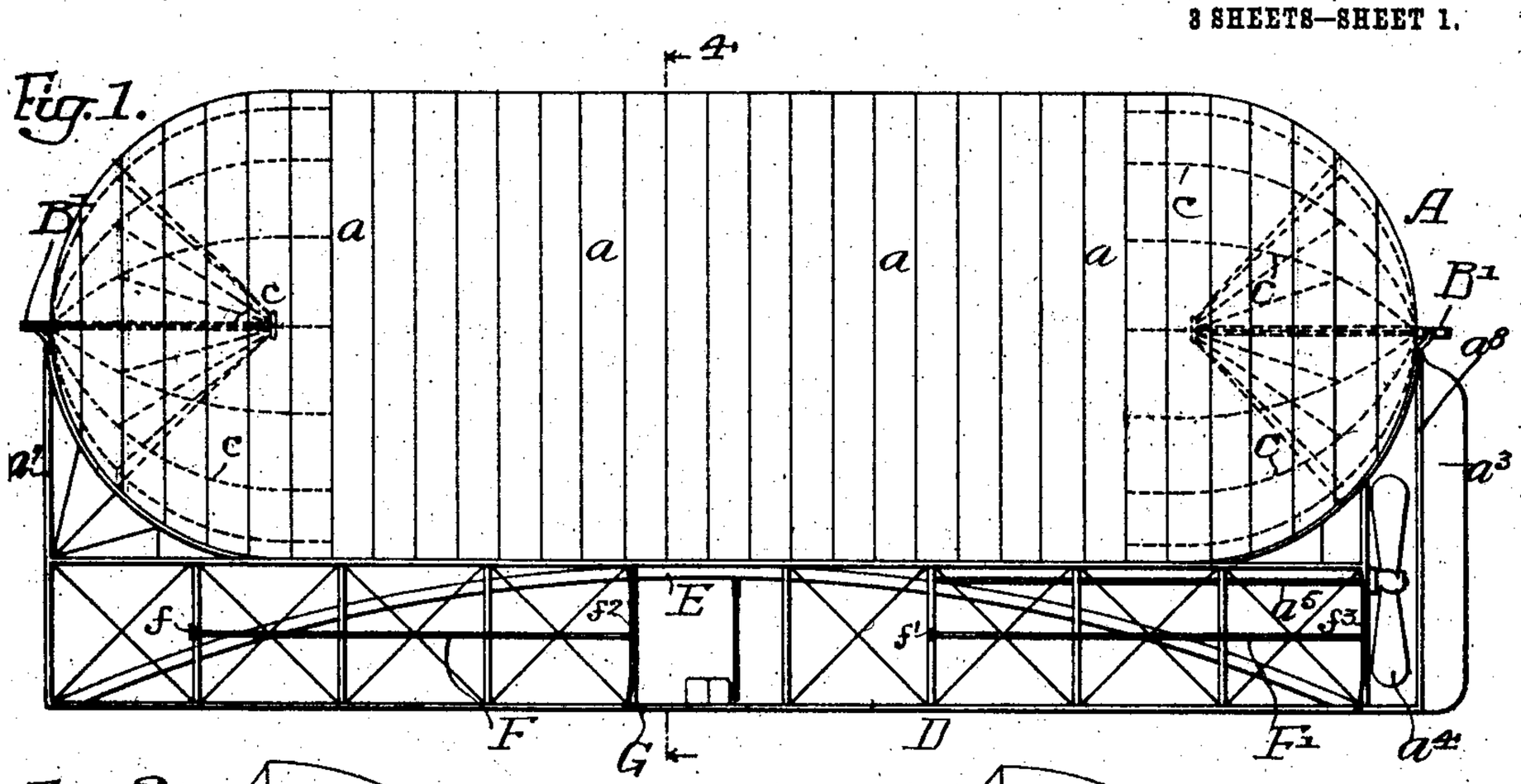


Fig. 2.

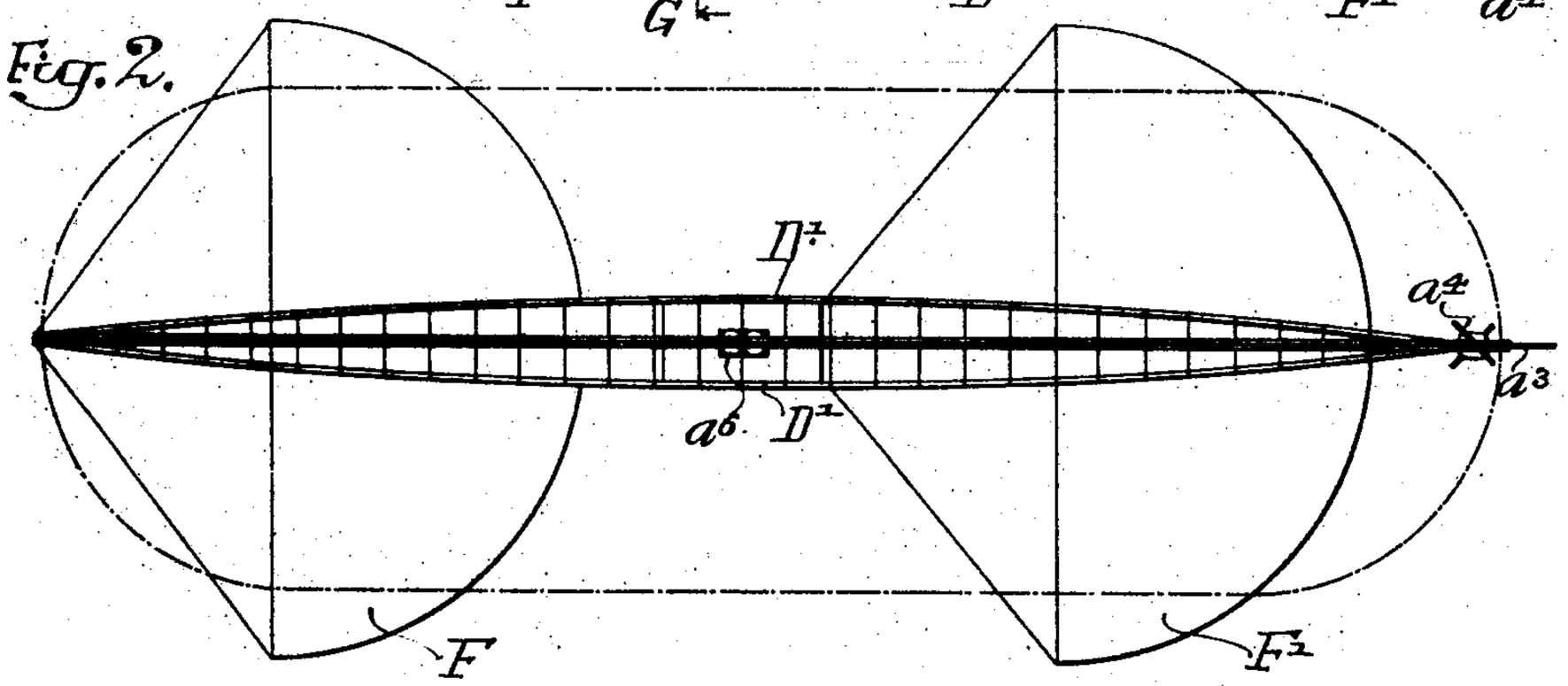
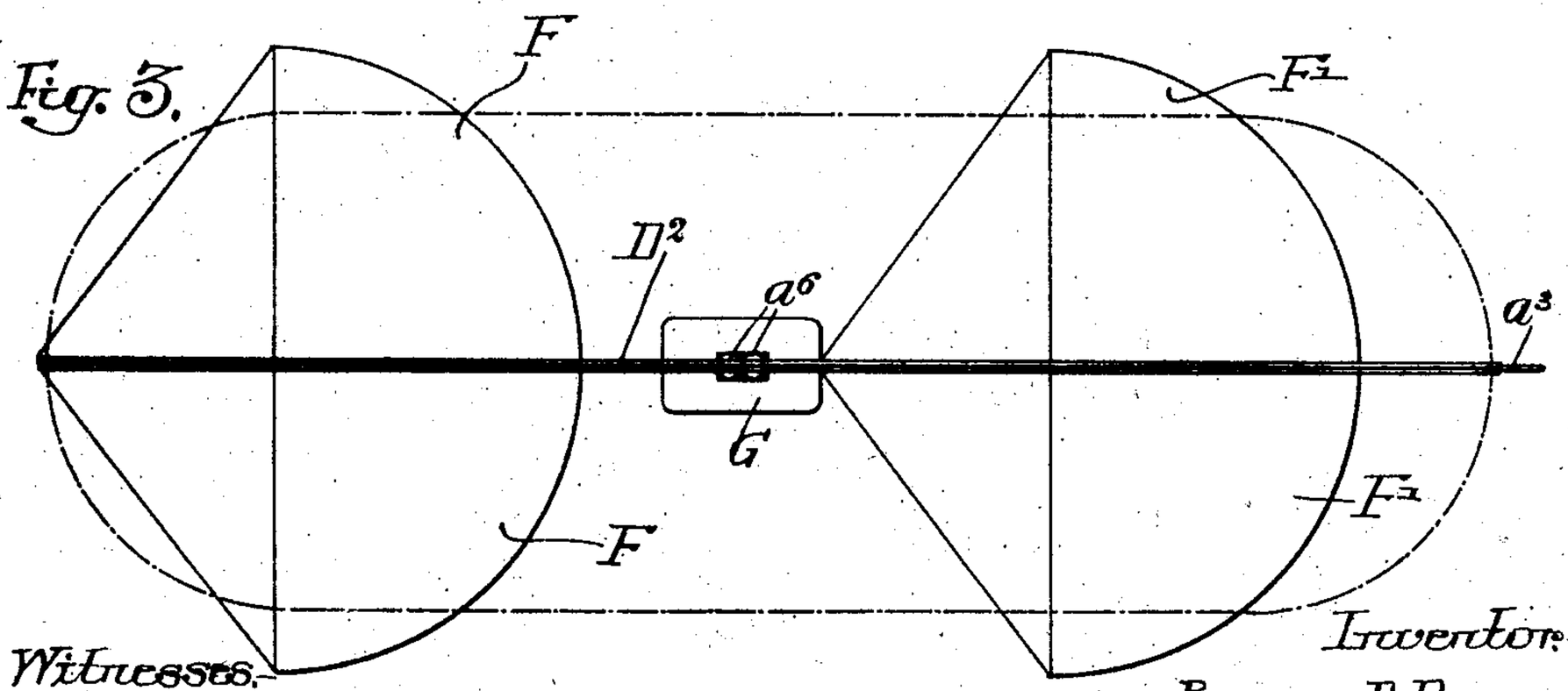


Fig. 3.



Witnesses.-

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3 SHEETS—SHEET 2.

Fig. 4.

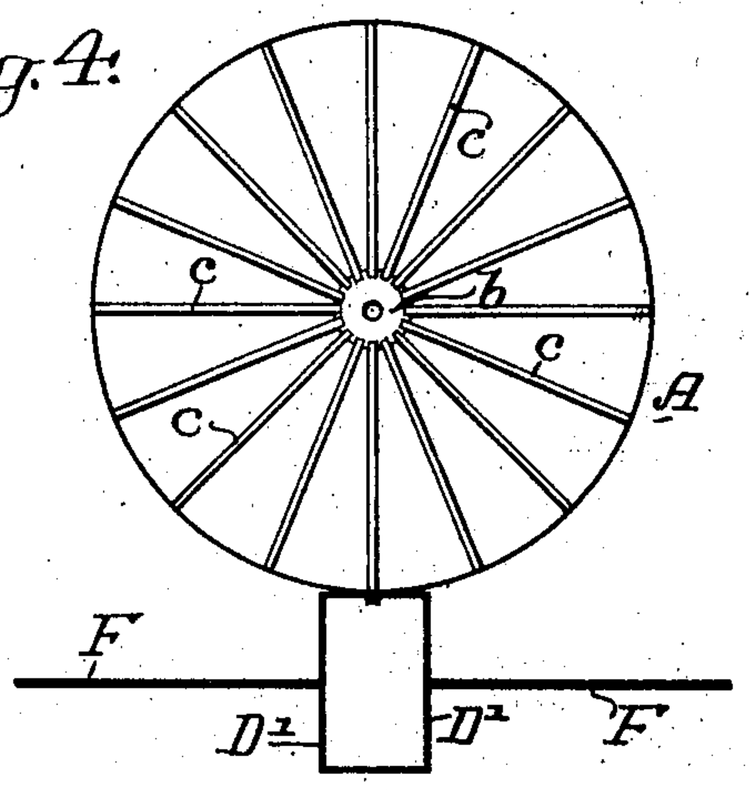

Fig. 8.

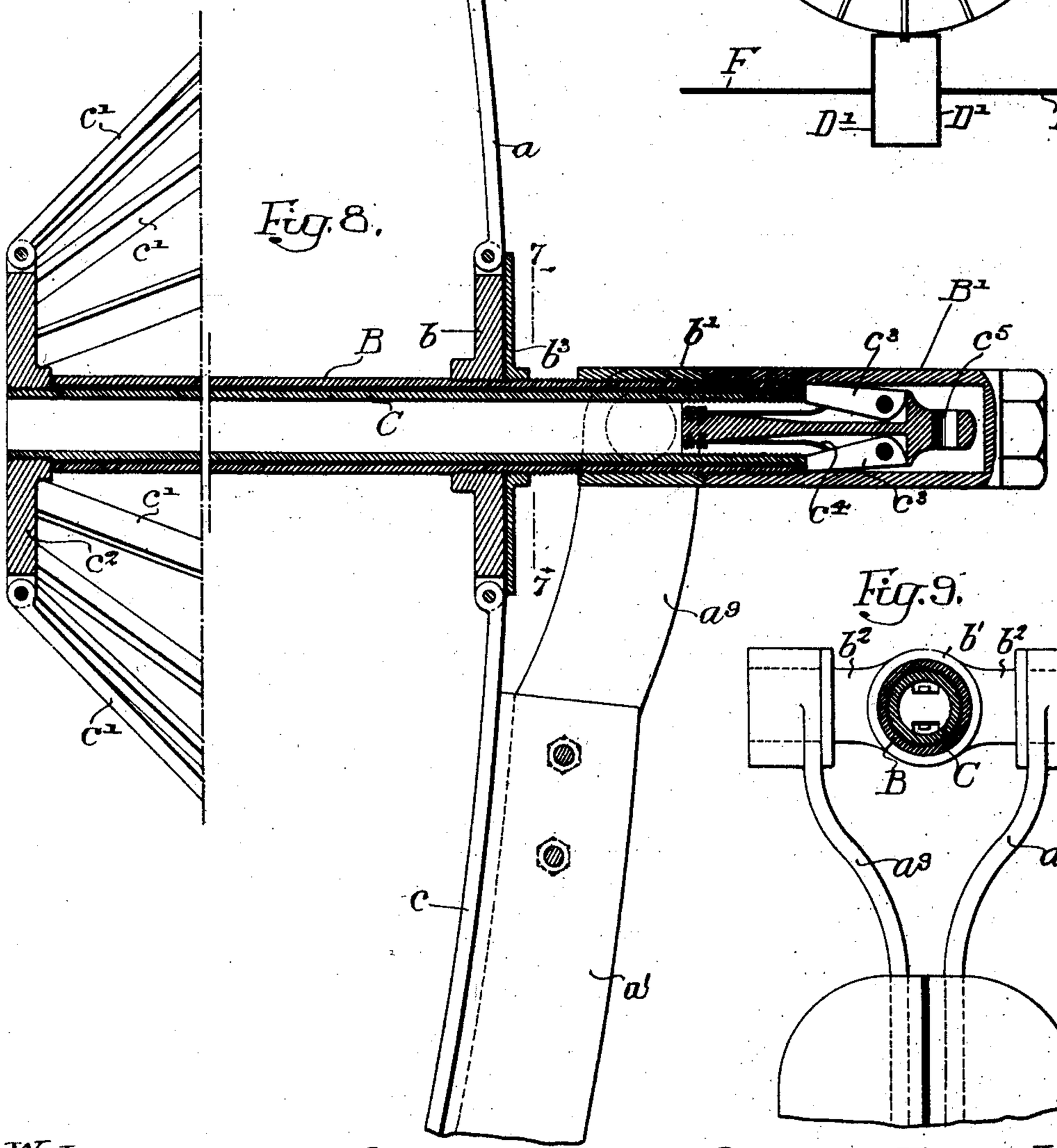

Fig. 9.

Fig. 7.

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3 SHEETS—SHEET 3.

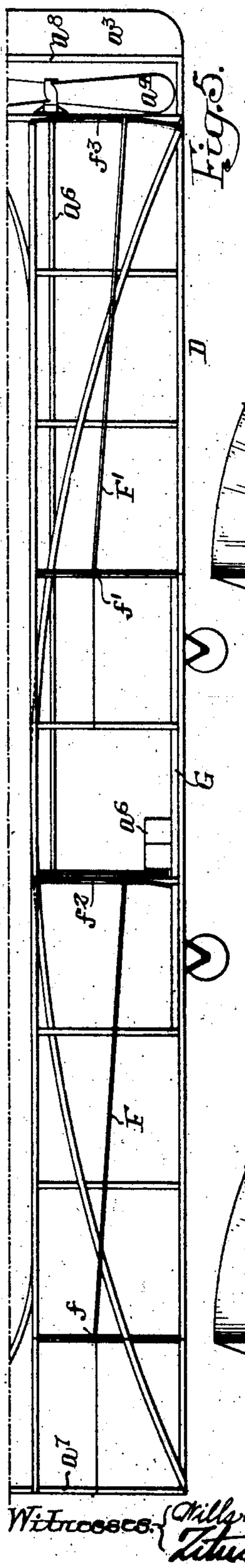

Fig. 5.

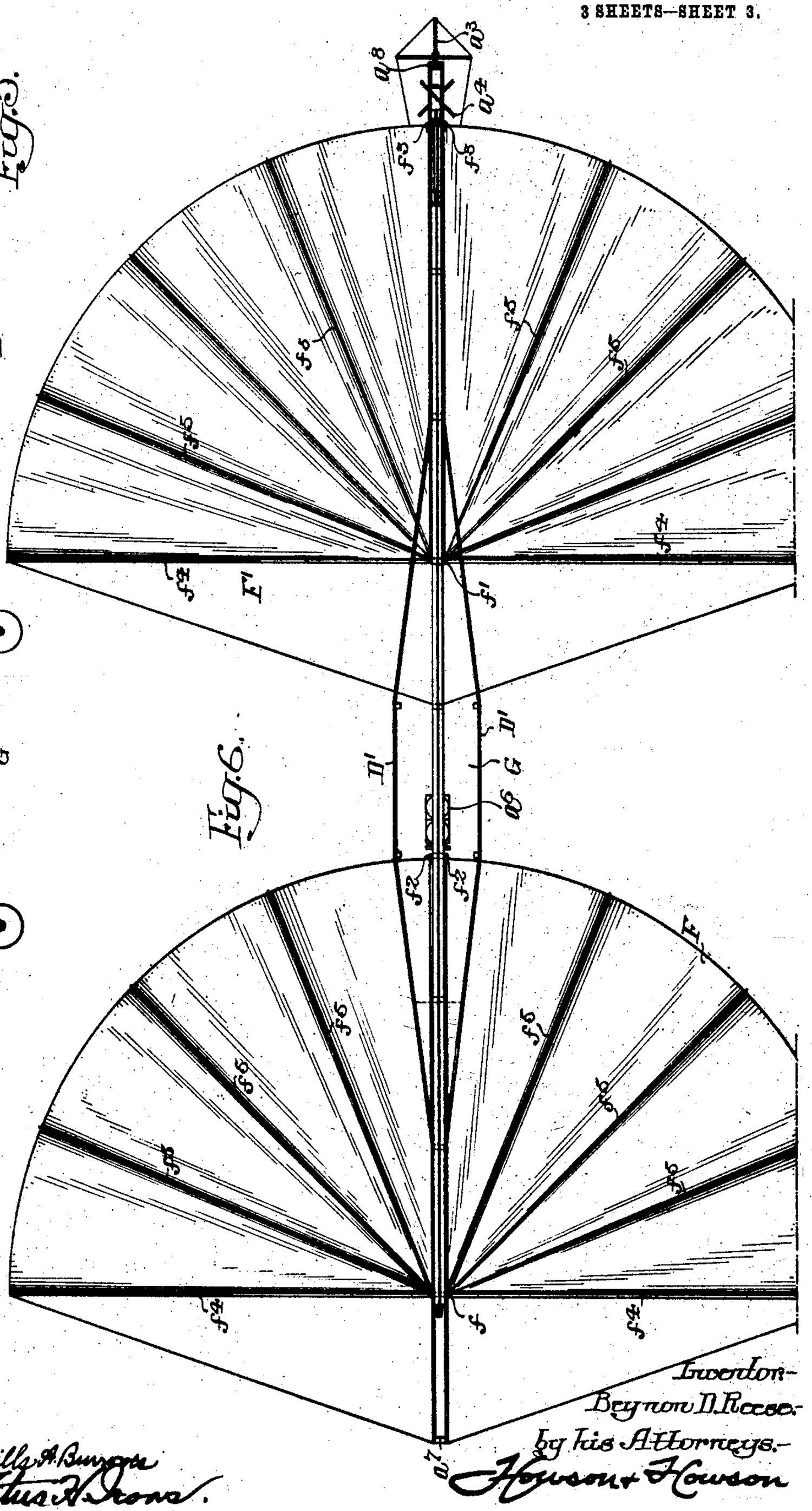

Fig. 6.

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UNITED STATES PATENT OFFICE.

BEYNON D. REESE, OF PHILADELPHIA, PENNSYLVANIA.

DIRIGIBLE BALLOON.

939,089. Specification of Letters Patent. **Patented Nov. 2, 1909.**

Application filed June 8, 1909. Serial No. 500,940.

To all whom it may concern:

Be it known that I, BEYNON D. REESE, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented certain Improvements in Dirigible Balloons, of which the following is a specification.

One object of my invention is to provide an improved truss construction for the support of the car, motor, rudder, steering gear, etc. of a dirigible balloon, which shall be of such design as to most satisfactorily serve to connect these various parts to the gas bag.

It is further desired to provide novel means for holding the truss to the gas bag, as well as a novel supporting device for the end portions of the gas bag, whereby these may be suitably supported when said bag is deflated.

I also desire to provide a dirigible balloon with collapsible supports for its gas bag and novel means for connecting said supports with the structure upon which is mounted the steering, propelling and passenger carrying apparatus.

Another object of the invention is to provide improved means for controlling the ascent and descent of the balloon.

These objects and other advantageous ends I secure as hereinafter set forth, reference being had to the accompanying drawings, in which:—

Figure 1, is a side elevation illustrating a dirigible balloon constructed according to my invention; Fig. 2, is a plan in which the gas bag has been omitted; Fig. 3, is a similar plan of a modified form of the invention; Fig. 4, is a vertical section on the line 4—4, Fig. 1; Fig. 5, is a side elevation of the truss structure, showing in detail the side controlling planes; Fig. 6, is a plan similar to Fig. 2, showing the controlling planes more in detail; Fig. 7, is an enlarged fragmentary section illustrating the method of closing the gas bag and of connecting it to the truss structure. Fig. 8, is a vertical section illustrating the detail construction of the collapsible device for holding the ends of the balloon in an open or spread position when the gas bag is deflated, and Fig. 9, is a section on the line 7—7, Fig. 8.

In the above drawings, A represents the gas bag of a dirigible balloon, which preferably has the shape of a cylinder provided with hemispherical ends. Both cylinder and ends are made up of annular sections *a* of material suitable for the construction of the gas bag of a balloon, connected to each other edge to edge so as to make gas tight joints, and with their ends brought together at the bottom of the balloon, which is thus capable of being opened from end to end along its bottom line. For joining the edges of this opening so as to close the same and render the gas bag tight, I provide two relatively light metallic rolled sections *a'*, in the present instance shown as angles, so mounted that their adjacent flanges may be held together by bolts a^2 and caused to clamp between them the edges formed by the ends of all of the sections *a*.

It will be understood that if the contacting faces of the material of the sections *a* do not form a sufficiently tight joint, suitable packing may be placed between them or any suitable cement may be used to accomplish this end.

For keeping the hemispherical ends of the balloon in an extended position after the balloon has been deflated or before it is inflated, I provide a construction not unlike the frame of an umbrella, but preferably constructed as shown in Fig. 8. For this purpose I provide a tube B on which is mounted a flange *b* and a collar *b'* having trunnions b^2. Said flange is provided with a clamping plate b^3 whereby the material of the gas bag, which is pierced at its ends by these tubes, is caused to make a gas tight joint or connection therewith. Pivoted to said flange *b* are a series of ribs *c* radiating therefrom within and attached to each end of the gas bag, and these ribs have a series of struts or stretchers *c'* which in turn are pivoted to a flange c^2 which is mounted upon a tube C slidable within the tube B.

As noted, the construction of the ribs and stretchers is somewhat similar to that characterizing the well known construction of an umbrella, with the exception that the tube C, which is the equivalent of the runner of an umbrella, passes through the end of the balloon and carries mounted on its outer end a pair of pivotally mounted catches c^3 normally pressed outward by springs c^4.

The end of the tube C is provided with an eye or ring c^5 which may be engaged by a hook, or used for the attachment of a cord

or chain. The arrangement of the parts is such that when the tube C is pulled outwardly from the gas bag to its maximum extent, the stretchers c' attached to it bring the ribs c, and with them the end of the gas bag to which they are attached, to an open or expanded position, and under these conditions the catches c^3 are forced outwardly by the springs c^4 so that their ends engage the end of the tube B, thereby retaining the ribs in their expanded positions. For preventing leakage of gas through said tubes I thread the outer end of the tube B and screw thereon a removable cap B'.

In Figs. 1, 5 and 6, a^3 is the rudder and a^4 the propeller which is mounted upon the shaft a^5, driven from the motor a^6. These parts are suitably mounted in any desired manner upon a trussed frame D which consists primarily of two vertically placed trusses D' whose end portions come together to form relatively sharp edges from which they gradually diverge until the middle points are reached. Suitable connecting or spacing members are mounted between these two trusses, which are connected to the longitudinally extending rolled sections a'; which, as before noted, are directly connected to the gas bag and consequently transmit thereto the weight of the trusses and of the apparatus and material supported thereon.

It will be understood that the two trusses are constructed with a view to securing the greatest strength and rigidity with the least weight, and it is obvious that with the arrangement thus illustrated, this end is satisfactorily obtained. In addition to these two trusses, I combine with them a curved member E, which with them forms what is in effect a bow-string truss construction, this member extending from the highest point of the middle of the two trusses D' to the lowest corner of the ends thereof. By this means I secure not only greatly increased strength and rigidity for the structure carried by the gas bag, but also provide means whereby the load produced by this structure and the parts carried thereon is most satisfactorily transmitted to the gas bag. It will be understood that in addition to connecting the truss structure directly to the material of the gas bag, as shown in Fig. 5, I may also employ the well known bag covering netting, which, however, has been omitted from the drawing in order to avoid complication. The method of use of such netting is, however, well known in this art and it may be applied as found desirable.

The truss structure D has at its ends vertically extending members a^7 and a^8 whereby in connection with various tension members and the rolled sections a', it is rigidly connected to the two members a^9 which are provided with bearings for the trunnions b^2. As a result, there is possibly a slight amount of up and down movement of the end portions of the balloon relative to the truss structures to which it is attached.

Side steering planes F and F' are also provided, these being hinged or pivoted at their front ends to the sides of the truss structure at f and f' and being movably guided at their rear ends on suitably curved bars f^2 and f^3. These rear ends of the planes may be raised or lowered from the engineer's platform G by any desired mechanism whose detail construction forms no part of the present invention.

Each plane consists of a series of ribs f^4 and f^5 radiating from their pivotal supporting points f or f', and capable of being brought to a position substantially parallel with and against the sides of the truss structure. Extending between and covering the ribs is any suitable body of fabric or other material. Said planes are normally spread in the positions shown, where they are held by any suitable system of ropes which are capable of adjustment so as to permit said planes to be furled along side of the truss structure when the machine is not in use.

In some cases it may be found desirable to employ a single truss D', so that the construction appears as shown at D^2 in Fig. 3.

When it is desired to inflate the balloon the gas bag is suitably mounted and is connected to the rolled sections a', while the truss structure D is supported in the position shown in Fig. 1. The stretchers c' for each end of the balloon are then brought to their expanded positions by moving the tube C outwardly until its catches c^3 spring outwardly beyond the ends of both tubes into engagement with the tube B', after which gas may be forced into or admitted to the bag in the well known manner. Similarly, when it is desired to deflate the balloon, the catches c^3 are turned inwardly on their pivots so that their ends disengage the ends of the tube B, after which the tube C is free to move into the balloon so as to permit the ribs and stretchers to collapse. The gas bag may then be separated from the rolled sections a' in order to be packed for shipment or storage and the truss structure may be taken apart to any desired extent for the same purpose.

Under conditions of use the propeller is driven from the motor, which is controlled in any desired manner by an operator on the platform G. The lateral movement of the balloon is governed by manipulating the rudder a^3 in the well known manner, while its up and down movements are controlled by the side planes whose rear ends may be raised or lowered at will to secure the desired results.

It will be understood that the truss structure and its controlling plane may, if desired, be employed for aerial navigation as

part of a machine of heavier-than-air type, since various features of the construction shown and described are applicable to this latter type of machine, as well as to that forming the main subject of this application.

It will be understood, of course, that under these conditions the upwardly extending end portions of the structure might be omitted, but in case of injury to the bag under any conditions, the controlling planes are of such an area as to be amply sufficient for purposes of aerial navigation, independently of such bag.

I claim:—

1. A dirigible balloon consisting of a gas bag and a structure carried thereby, said bag consisting of a series of circumferentially extending strips joined edge to edge and all terminating so as to form a single longitudinal opening in the bag, with means for clamping together the edges of said opening formed by the ends of the strips so as to close the opening.

2. The combination in a dirigible balloon of a gas bag, a truss structure hung therefrom, and means attached to said structure for holding the ends of the gas bag in an expanded position, said means being capable of being collapsed or expanded at will.

3. The combination in a dirigible balloon of a gas bag, propelling mechanism, and a structure hung from said bag for supporting said propelling mechanism, said structure consisting of a vertically placed panel truss, in combination with a curved member extending from the central upper portion of said truss structure downwardly to the end thereof.

4. The combination in a dirigible balloon of a gas bag consisting of a substantially cylindrical body and hemispherical ends, ribs for said ends, and means for expanding or collapsing said ribs at will, with a truss structure hung from the gas bag, and propelling means carried by said structure.

5. The combination in a dirigible balloon of a gas bag, means for maintaining the ends of said bag in an expanded position, the same including spindles passing through each end of the bag and respectively provided with trunnions, and a truss structure attached to the bag and movably connected to said trunnions.

6. The combination in a dirigible balloon of a gas bag having ribs for maintaining its ends in an expanded position, a spindle passing through each end of said gas bag, stretcher members connecting each spindle with the ribs, and means for holding said spindle in a position to retain the ribs in an expanded position, with a structure hung from said gas bag.

7. The combination in a dirigible balloon of a gas bag having a series of ribs at each end for maintaining the same in an expanded position, stretcher members for said ribs, a longitudinally movable spindle passing through each head, catches carried by each spindle for maintaining the same in a position with the ribs expanded, trunnions connected to said spindles, and a structure hung from the gas bag and provided with bearings for the reception of said trunnions.

8. The combination in a dirigible balloon of a gas bag made up of a series of circumferentially extending strips joined edge to edge and arranged with their ends terminating in the same line so as to form a longitudinally extending opening, a pair of rolled sections having means for clamping between them the ends of said strips so as to close said openings, and a truss structure connected to said rolled sections so as to be hung from the gas bag.

9. The combination in a dirigible balloon of a gas bag a frame carried thereby, a guide bar on each side of the frame, and controlling planes projecting laterally from opposite sides of the frame and pivotally connected thereto at one end, the opposite ends of the planes being adjustable up and down on said guide bars.

10. The combination in a dirigible balloon of a gas bag, a frame carried thereby, and laterally projecting planes mounted on opposite sides of said frame, each of said planes consisting of a plurality of radiating ribs pivotally attached to the frame and a body of sheet material mounted on the ribs, with guiding means on the frame in engagement with the rear ends of the planes for permitting their up and down adjustment.

11. A device for aerial navigation consisting of a main supporting frame having two collapsible controlling planes on opposite sides thereof, said planes being adjustable up and down at one end.

12. A device for aerial navigation consisting of a main supporting structure, and controlling planes on opposite sides thereof, each of said planes being constructed to be furled or spread at will, and being movably attached to the structure at their front ends as well as adjustable up and down at their rear ends.

13. A machine for aerial navigation consisting of a main supporting structure and two pairs of collapsible controlling planes respectively on opposite sides thereof, said planes being each adjustable up and down at one end.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

BEYNON D. REESE.

Witnesses:

WILLIAM E. BRADLEY,

WM. A. BARR.